DOCUMENT RESUME

ED 067 264 SE 014 711

TITLE	First-Year, Full-Time Graduate Science Enrollment Continues to Decline.
INSTITUTION	National Science Foundation, Washington, D.C.
REPORT NO	NSF-72-308
PUB DATE	25 May 72
NOTE	4p.
JOURNAL CIT	Science Resources Studies Highlights; May 25, 1972
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Enrollment Rate; Fellowships; *Graduate Study; *Mathematics Education; *Research; *Science Education; Student Enrollment
IDENTIFIERS	National Science Foundation

ABSTRACT

Findings from a study of departmental data derived from traineeship applications in the sciences (including mathematical sciences) are presented in this paper. Data on full-time graduate enrollments from 1969 to 1971 are analyzed by type of institution, with results showing a continuing decline in first-year, full-time graduate science enrollment. Data on types and sources of major support for graduate science students during the 1969-1971 period are given and show a decline of support by fellowships and traineeships and by the Federal Government. Data showing an increase in the number of faculty and postdoctoral appointments for 1970-71 are included also. (DT)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

NSF SE

ED 067264

SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION • WASHINGTON, D.C. 20550 • MAY 25, 1972 • NSF 72-308

First-Year, Full-Time Graduate Science Enrollment Continues To Decline

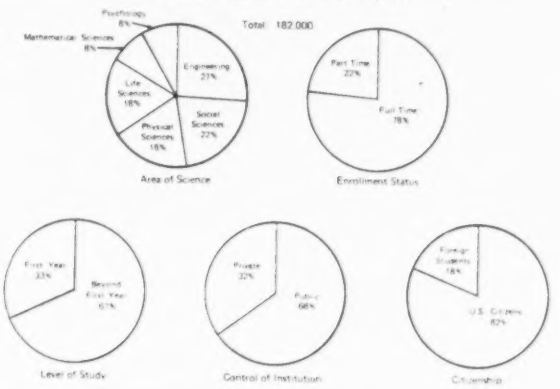
- In doctorate-granting institutions, first-year, full-time graduate science enrollment decreased 5 percent between 1970 and 1971, after decreasing 2 percent in the previous year.
- The "top 20" graduate institutions experienced reductions in their first-year, full-time enrollment at the greatest rate—8 percent.
- Virtually all areas of science experienced reductions in first-year full-time enrollment.
- The number of full-time graduate students supported primarily by fellowships and traineeships declined nearly 10 percent from 1970 to 1971.
- The proportion of full-time graduate students receiving their primary support from the Federal Government declined from 37 percent in 1969 to 32 percent in 1971.

The findings in this *Highlights* result from a recent study of departmental data derived from traineeship applications. These data were supplied to the National Science Foundation by 2,990 doctorate-granting departments and are considered highly representative of the national science enrollment picture. When fall 1970 traineeship applications were analyzed in an earlier study, it was found that they represented 80 percent of the total U. S. enrollment for advanced degrees in science and engineering reported to the Office of Education, and 98 percent of the doctorates awarded in all fields.[1]

Total Graduate Science Enrollment

The reporting doctorate departments enrolled a total of 182,000 graduate science students in 1971, of which 78 percent were attending full time (chart 1). To determine the enrollment trend over a 3-year period in basically similar departments, those reporting for 1971 were matched with identical departments reporting for both 1969 and 1970. In this matched set of 2,579 departments, graduate science enrollment declined 1 percent from 1969 to 1970, and 3 percent from 1970 to 1971, continuing the downward trend noted in the previous study.

CHART 1. SELECTED CHARACTERISTICS OF GRADUATE ENROLLMENT IN DOCTORATE SCIENCE DEPARTMENTS, 1971



Source: National Science Foundation

Publicly controlled institutions attracted 68 percent of the graduate science students in 1971 and private institutions, 32 percent. From 1970 to 1971, graduate enrollment declined 1 percent in public institutions but at a more rapid rate of 6 percent in those under private control. Engineering held first place in the total number of graduate students enrolled in 1971, as in the seven previous years of the collection period of these statistics. This field has traditionally been dominated by the largest percentage of part-time, foreign, and first-year students.

The general decline in graduate enrollment occurred in all areas of science except psychology and the social sciences. The substantial drop in part-time enrollment was heavily influenced by the 15-percent decline in the physical sciences (table 1).

[1] See National Science Foundation, *Graduate Student Support and Manpower Resources in Graduate Science Education, Fall 1970* (NSF 71-27) (Washington, D. C. 20402: Supt. of Documents, U. S. Government Printing Office), 1971.

SE 014 711

Prepared in the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies

Table 1.—Percent change in graduate enrollment in doctorate departments, by area of science and enrollment status, 1969-71[a]

Area of science	Total		Full time		Part time	
	1969-70	1970-71	1969-70	1970-71	1969-70	1970-71
Total ...	−0.7	−2.9	b	−1.5	−3.1	−7.9
Engineering .	−1.7	−5.7	2.6	−2.0	−8.0	−11.8
Physical sciences	−3.5	−5.6	−3.4	−4.3	−4.1	−14.7
Mathematical sciences ..	.3	−5.8	1.3	−4	−3.2	−10.9
Life sciences	1.2	−1.1	.4	.1	8.1	−10.0
Psychology .	1.5	4.2	1.2	4.8	3.8	−.2
Social sciences	.5	.4	−.6	−.9	4.0	4.5

[a]Data are based on 2,579 doctorate departments reporting in fall 1969, 1970, and 1971.

[b]Less than 0.05 percent change.

Full-time Graduate Enrollment

The pattern in full-time graduate enrollment, particularly of first-year students, is an important indicator of the size of the future scientific manpower pool. The continuing downward trend is due to a number of factors. These include influence of a shrinking employment market in some fields on prospective graduate students, voluntary cutbacks in enrollment by private universities, and more stringent controls in public institutions. Also, some college graduates may be forced to postpone entry into graduate school until outside support in their field is more readily attainable.

Analysis by Type of Institution. The institutions participating in the Graduate Traineeship Program were separated into four categories to examine further the enrollment dynamics among various types of institutions. The categories are: (1) the "top 20" institutions, chosen on the basis of the number of NSF fellows attending during the period 1968 through 1971 and the amount of Federal R&D funds obligated in fiscal year 1970; (2) the 65 "developing" graduate institutions that began granting science Ph.D.'s after 1960; (3) the 12 medical schools applying for traineeships; and (4) the 127 remaining institutions, called "intermediate."

A close look at the declining rate of first-year, full-time enrollment in the two periods studied indicates that prevailing conditions have changed within the public and private institutions within the "top 20." For instance, the 13 private institutions reduced enrollment radically in the earlier stages of funding restrictions, but this tendency has recently been modified. In contrast, the seven public schools reduced first-year entrants at a greater rate in the most recent period than earlier (table 2).

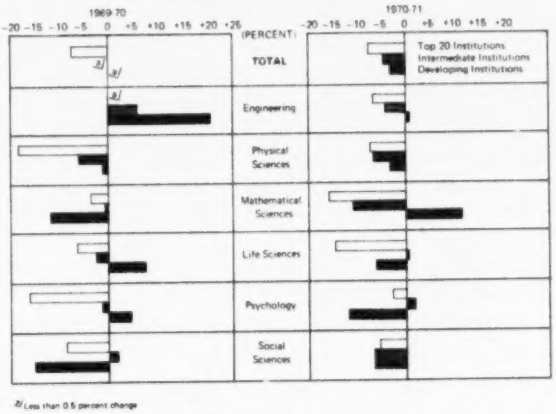
Table 2.—Percent change in first-year, full-time graduate enrollment in doctorate departments, 1969-71

Number of institutions	Type of institution	1969-70	1970-71
224	All institutions, total	−2.2	−5.0
20	Top 20 institutions ...	−7.4	−7.8
	7 Public	(-4.1)	(−12.6)
	13 Private	(-11.1)	(−2.1)
127	Intermediate institutions	−.2	−4.2
65	Developing institutions	.1	−3.0
12	Medical schools	−14.5	−9.2

Chart 2 illustrates the changes in first-year enrollment within each area of science as experienced by the three principal categories.[2] The "top 20" schools reduced first-year, full-time enrollment at a greater rate than did the developing or intermediate institutions in both 1970 and 1971. Although the developing institutions reported gains in engineering, life sciences, and psychology in 1970, these gains were not maintained in 1971. Likewise, the remaining, or intermediate, institutions increased first-year enrollment in engineering and social sciences, but this increase did not continue in 1971.

Types and Sources of Major Support. Fellowships and traineeships in 1971 accounted for 25 percent of the primary support of full-time students, as compared with 28 percent in 1970 and 30 percent in 1969. The number of students receiving this form of support declined 10 percent over 1970—the highest rate of decline of all

CHART 2. CHANGES IN FIRST-YEAR FULL-TIME ENROLLMENT IN DOCTORATE SCIENCE DEPARTMENTS



a/Less than 0.5 percent change

Source: NSF traineeship statistics from 2,579 doctorate departments

[2]Since the medical schools applying for traineeships accounted for only 129 first-year students in 1971, the 9-percent reduction in their enrollment does not have a significant impact on the overall results and was not considered illustrative.

2

types of outside support. Social science students had the smallest relative external support, while the physical science students had the smallest percentage of "other" support, primarily self-support. Fellowship or traineeship support was available to only 20 percent of the full-time students in publicly controlled institutions, but this same type of support was available to 38 percent in private institutions.

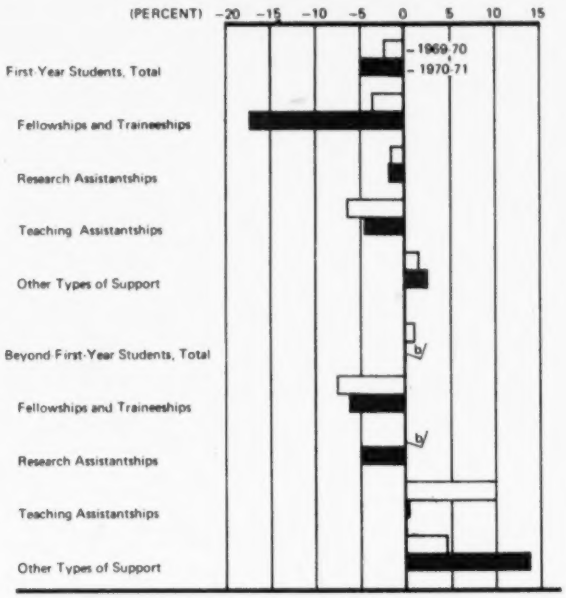
Fellowship-traineeship support to first-year students showed the highest rate of decrease of all the mechanisms of outside support available, as illustrated in chart 3. The number of students beyond their first year remained relatively stable, although fellows-trainees and research assistants declined. The increase in students depending upon "other" types of support, primarily self-support, indicates that the slack in outside support is being taken up gradually by the students and their families.

The 113,400 full-time students with U. S. citizenship constituted 80 percent of the full-time enrollment in 1971; foreign students, 20 percent, about the same proportions as in 1969 and 1970. The type of support available to the U.S. citizen differs from that of foreign students; e.g., fellowships and traineeships were held by 27 percent of the U.S. citizens but by only 18 percent of the foreign students. In contrast, research assistantships were held by 19 percent of the U.S. citizens but by 29 percent of the foreign graduate students.

In 1971, the Federal Government reduced its share of support of full-time graduate students to 32 percent from 37 percent in 1969. There was a corresponding increase in self-supported students—from 19 percent in 1969 to 22 percent in 1971. From 1970 to 1971 federally supported fellowships and traineeships were reduced by 13 percent, and research assistantships by 5 percent. The full impact of recent major reductions in Federal traineeship awards will not be observable until academic year 1972.

Chart 4 illustrates the relative position in each field of science of the four sources of major support in 1971. The physical science students relied on self-support to the least extent; social science students the most. The Federal Government provided support to almost 40 percent of the full-time students in four areas of science—physical and life sciences, psychology, and engineering. Students receiving institutional support were concentrated in the physical and mathematical sciences.

CHART 3. CHANGE IN THE NUMBER OF FULL-TIME GRADUATE STUDENTS IN DOCTORATE DEPARTMENTS, BY LEVEL OF STUDY AND TYPE OF MAJOR SUPPORT, 1969-71[a]

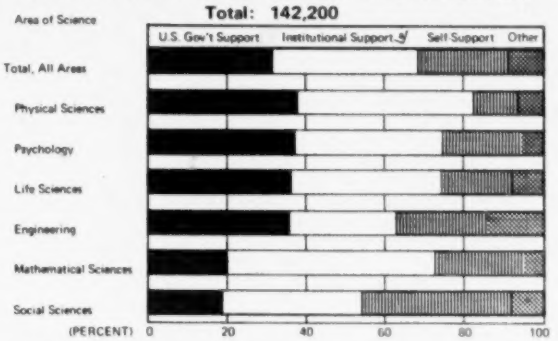


[a]/Data are based on 2,579 doctorate departments reporting in fall 1969, 1970, and 1971.

[b]/Less than 0.5 percent change.

Source: National Science Foundation

CHART 4. DISTRIBUTION OF FULL-TIME GRADUATE STUDENTS IN DOCTORATE DEPARTMENTS, BY SOURCE OF MAJOR SUPPORT, 1971



a/Includes institutions and State and local governments.

Source: National Science Foundation

Faculty and Postdoctorals

While total graduate enrollment declined, from 1970 to 1971 full-time graduate faculty (those teaching at least one graduate course or directing at least one graduate student) increased slightly, although less than 1 percent, and postdoctoral appointees increased by 5 percent. The doctorate departments included in the study reported a total of 57,400 full-time faculty in 1971, of which 85 percent were significantly involved in graduate teaching or research, as in 1970. Also, as in past years, over one-fourth of all graduate faculty were engaged in the life sciences.

In 1971, the number of postdoctoral appointments totaled 9,250, with 71 percent receiving their Ph. D.'s in 1967 or later. Over 80 percent of the appointees were engaged in the physical and life sciences; this percentage

corresponds closely with the proportion of R&D expenditures in these fields reported by doctorate-granting institutions for academic year 1970-71.[3]

Table 3 compares the changes in manpower resources which took place in the academic community among the six areas of science.

A more detailed analysis of traineeship applications will be made in a final report, *Graduate Student Support and Manpower Resources in Graduate Science Education, Fall 1971*, to be published later in 1972.

[3]See National Science Foundation, *Resources for Scientific Activities at Universities and Colleges, 1971*, to be published by the U. S. Government Printing Office later this year.

Table 3.—Percent change in graduate enrollment, graduate faculty, and postdoctoral appointees in doctorate departments, 1970-71

Area of science	Total graduate enrollment	Full-time graduate faculty	Postdoctoral appointees
Total	2.9	0.7	5.3
Engineering	−5.7	.3	12.5
Physical sciences	−5.6	−.6	7.4
Mathematical sciences	−5.8	.2	−6.2
Life sciences	−1.1	3.2	2.1
Psychology	4.2	−.2	4.7
Social sciences	.4	.2	a

[a]No change.

National Science Foundation
Washington, D.C. 20550

Official Business
PENALTY FOR PRIVATE USE, $300

Postage and Fees Paid
National Science Foundation

U.S.MAIL

THIRD CLASS